

# Distributed Energy Road Show

May 22, 2003  
Sturbridge Host Hotel  
Sturbridge, Mass.

**Special Joint Seminar - Building, Electrical, Plumbing/Gas and Fire Prevention Inspectors**



Sponsored by: Massachusetts Building Commissioners and Inspectors Association (MBCIA) and the U.S. Department of Energy's Boston Regional Office



# Agenda

- 7:00 a.m. Registration/Check-in**
- 8:00 Welcome**  
*Gerald A. Brown, Massachusetts Building Commissioners and Inspectors Association (MBCIA)*  
*Brian Gore, Massachusetts Board of Building Regulations and Standards (BBRS)*
- 8:30 Distributed Energy: The National Perspective**  
*Anne-Marie Borbely-Bartis, Battelle at U.S. Department of Energy*
- 9:00 Hydrogen: Basics and Use**  
*Jack Solomon, Praxair, Inc.*
- 9:45 Break**
- 10:15 Fuel Cells: Installation and Operation**  
*Scott Wilshire, Plug Power*
- 11:00 Microturbines: Installation and Operation**  
*Jim Watts, Ingersoll-Rand*
- 11:45 Overview of DG CD-ROM (recently released by U.S. DOE)**  
*Scott Hutchins, U.S. Department of Energy's Boston Regional Office*
- 12:00 p.m. Lunch (included)**
- 1:00 DG Interconnection**  
*Anne-Marie Borbely-Bartis, Battelle at U.S. Department of Energy*  
**DG Interconnection**  
*Jim Watts, Ingersoll-Rand*
- 1:45 Break**
- 2:15 Permitting DG Technologies and Air Quality**  
*Dale Raczynski, Epsilon Associates*
- 3:00 Structured Discussion and Q&A**  
*Facilitator: Anne-Marie Borbely-Bartis, Battelle at U.S. Department of Energy*
- 3:45 Adjourn**  
*Please take a moment to fill out the evaluation form in your packet*

# Workshop Notes – Q & A

## DE: The National Perspective

Q: Are installation guides available for these technologies?

A: During late Beta tests, manufacturers will have spec sheets available, but at that point, there won't be a large number of installations (perhaps 10 or 20, etc.)

Comment: Would an inspector "checklist" be useful?  
Yes.

Comment: The U.S. Department of Energy is funding a program that will include testing (e.g., intentionally blowing up a Hydrogen tank to see what results). This testing will result in the development of handbooks and inspector checklists over the next few years.

Q: Do you think that the actions taken in the two case studies you outlined in your presentation (microturbine at Fargo, N.D., hotel and the BPA fuel cell installation) were over-reactions? For example, was re-grading the road in the fuel cell example an over-reaction?

A: I wouldn't necessarily characterize them as over-reactions. Perhaps re-paving the road was a bit of an over-reaction, but most in the example were reasonable. It is difficult to determine in general what is or isn't reasonable – it is often determined on a case-by-case basis.

Q: What certifications do installers of these technologies need?

A: In the State of Massachusetts, is there a state certification for PV installers? No. Perhaps Massachusetts is looking to establish one?

Comment: Perhaps we need to develop certification programs on a state-by-state basis?

## Hydrogen: Basics and Use

Q: Is refueling an automobile with Hydrogen similar to refilling a propane tank?

A: The pressure is higher with Hydrogen but, in general, the answer is yes.

Q: Is Hydrogen sold by weight or cubic volume?

A: Either one/both.

Q: On the map that was shown in the presentation, I noticed that the dots were all in the Eastern part of the U.S. If I have a Hydrogen car in the Midwest, for example, can I refuel it?

A: Actually, the dots on the map depict where Hydrogen is made and distributed to industrial customers only. Currently, the only Hydrogen fueling stations are at LAX (L.A. airport) and soon to be at Las Vegas and a few other locations.

Comment: Maybe what we really need to do is to have existing fuel stations put gasoline (or other liquid) and then a reformer on the cars? Or perhaps off-site is better. We have to figure out which makes more sense.

Comment: Right now Hydrogen is classified as a hazardous substance.

Q: If gas is only 33% efficient, and we put it into a car and change it to Hydrogen somehow, then aren't we reducing the efficiency even more? Is it worth it?

A: You've made a good point here but please allow me to clarify. Gasoline as a fuel in your car is 100% efficient. Making gasoline out of crude oil is in fact efficient. If you put gasoline in a car and reform it into Hydrogen, that is inefficient.

Q: Is there any way to get Hydrogen from Nature?

A: Yes, through electrolysis. But this can be expensive. There is no "magic."

Q: If we wanted to rebuild a plant in Massachusetts (for example, the soft coal plant in Salem), would we be able to replace it with Hydrogen?

A: You'd probably want to have something new – such as a combined-cycle gas-fired plant.

Q: What is the by-product of Hydrogen?

A: Water.

Q: Is nuclear power "state-of-the-art"?

A: A plant hasn't been built in 25 years.

## **Fuel Cells: Installation and Operation**

Q: Could a fuel cell be used as standby generation?

A: Yes. Soon going to launch a DC power backup supply. A Direct H<sub>2</sub> system will go from stone cold to full power in about 20 seconds. Very near-term opportunity. Lead-acid batteries are troublesome for the telecommunications industry: high maintenance, irregularities, have to keep batteries cool. This brings up life-cycle cost issues.

## **Microturbines: Installation and Operation**

Q: How much clearance is required?

A: Three feet on all sides (mostly for maintenance).

Q: What about cost?

A: \$1,000/kW to \$1,100/kW initial capital cost. Installation costs can vary considerably (200% to 300%).

Reciprocating engines – down to a few hundred \$/kW. Heat capture – up to \$1,000/kW.

Let's put in it in the sense of kWh – 5 cents/kWh. If you have \$1.00/Therm in New England, 11 cents/kWh. With Cogeneration/CHP, you can get below 10 cents/kWh. In California, where gas is \$5-\$6/MMBtu, costs will be higher.

As for landfill gas—where the fuel is “free” (besides maintenance costs, etc.) —it could be as low as 5 cents/kWh to 6 cents/kWh.

Without cogeneration/CHP, it is comparable to buying from the grid. With cogeneration/CHP, it is cheaper.

You'll want to calculate the “spark spread.” In Massachusetts, the natural gas prices are slightly higher, so that will affect the spread.

### **Overview of DG CD-ROM (recently released by U.S. DOE)**

Q: Was the University of Maryland Chesapeake Building installation a retrofit?

A: The CHP Integration Test Center at the University of Maryland is testing CHP systems that have been engineered in the field, right outside the building. DOE, Oak Ridge National Laboratory, and the University of Maryland are working to learn how to integrate existing CHP systems into commercial buildings more effectively, test those systems, and transfer their expertise to other building owners. DOE and the University of Maryland co-fund the test center; Oak Ridge provides technical management.

### **DG Interconnection**

Q: Are the older units going to be grandfathered in?

A: That is really a question for the utility. For example, with “negawatts,” the utility would pay the consumer for what the consumer does not use (i.e., displacement).

Q: Does this apply to backup?

A: No, does not apply to backup. Backup genset that did not disconnect in one second.

Q: What about selling back to the utility?

A: Net metering. There is a size provision. If you are below 60 kW, put in bidirectional meter – utilities will pay you.

Comment: How is this different than wind, PV, etc.? At the national level, it makes sense to be looking at doing more with insertion closer to the load. That economic model makes sense. Originally, net metering – using PV at the peak – made sense. Now all involved are trying to figure out what happens next.

### **Permitting DG Technologies and Air Quality**

Q: What is different regarding maintenance for this type of equipment?

A: It is an IC engine that uses natural gas. You need someone there on-site. Much of the maintenance is done remotely.

Q: Are both units on-line at the same time?

A: Peak load is 6 MW. At the peak, both would be operating.

### **Structured Discussion and Q & A**

Question Posed to Attendees: *What do you think of the idea of distributed energy?*

Comment: We haven't had other training on this subject. This is the first.

Question Posed to Attendees: *What building code is used in Massachusetts?*

Comment: Sixth edition – '93 BOCA.

Question Posed to Attendees: *Are you going to "I" codes?*

Comment: Next year possibly. IBC – 2003 – modifying to make it Massachusetts code.

Why?

Mostly due to Massachusetts General Law. Accessibility and elevators have their own codes.

Question Posed to Attendees: *Has anyone here been called upon for a DG installation?*

Comment: Yes.

Fuel cell test site in Woburn.

Also called in to permit actual installations.

CGA listing and pending.

Q: Is DOE working through the ICC?

A: Yes. Neil Rossmeissl is funding ICC work. He's also funding other organizations and individual technologies.

- Q : I've heard of ocean wave technology being used in Germany. Is DOE planning to do work in the ocean wave technology arena?
- A: DOE is thinking about ways to utilize every BTU that is available. Europe has always had CHP. There are other influences: Kyoto Protocols, etc.
- Q : Is DOE trying to get everything to be decentralized (i.e., are they abandoning the central plant concept)?
- A: No, they are not abandoning the concept of centralized plants. The whole concept of distributed-ness has to do with fuel flexibility, "smart" buildings, (e.g. after the terrorist attack on the World Trade Center, the IT system was back up and running within 5 minutes.)
- Q : What about large residential power with a central source?
- A: That is more "dispersed" – i.e. the "village" power concept. There are—and have been for years—district heating loops and district cooling loops. Recently there have been more planned unit developments—high-end gated energy communities that share the same source (PV, fuel cells, etc.)